MAGTROL

DES 410 & DES 411

Power Supply

User's Manual

Purchase Record

Please record all model numbers and serial numbers of your Magtrol equipment, along with the general purchase information. The model number and serial number can be found on either a silver identification plate or white label affixed to each unit. Refer to these numbers whenever you communicate with a Magtrol representative about this equipment.

Model Number: _____

Serial Number: _____

Purchase Date: _____

Purchased From: _____

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1st Edition - revision A - February 2014

MAGTROL

Safety Precautions

1. Make sure that all Magtrol dynamometers and electronic products are earth-grounded, to ensure personal safety and proper operation.
2. Check line voltage before operating electronic equipment.
3. Make sure that dynamometers and motors under test are equipped with appropriate safety guards.

Revisions To This Manual

The contents of this manual are subject to change without prior notice. Should revisions be necessary, updates to all Magtrol User's Manuals can be found at Magtrol's web site at www.magtrol.com/support/manuals.htm.

Please compare the date of this manual with the revision date on the web site, then refer to the manual's Table of Revisions for any changes/updates that have been made since this edition.

REVISION DATE

1st Edition - revision A - February 2014

DATE	EDITION	CHANGES	SECTION
02/19/14	1st Edition - rev A	Passing shielded cables into stuffing gland procedure added	2.6.2
02/19/14	1st Edition - rev A	Figure 2-6 Update Stuffing gland view	2.6
02/19/14	1st Edition - rev A	Notes about EMC stuffing gland was added	2.8, 2.9
02/19/14	1st Edition - rev A	Figure 2-10 and 2-11 Update connecting drawing	2.8, 2.9
October 2013	First Edition English		

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Preface

PURPOSE OF THIS MANUAL

This manual has all the necessary information regarding the installation, connection and use of Magtrol's DES 410 and 411 Power Supply. To achieve maximum capability and ensure proper use of the system, please read this manual in its entirety before operating. Keep the manual in a safe place for quick reference whenever a question should arise.

WHO SHOULD USE THIS MANUAL

This manual is for users who want to install and use the Magtrol DES 410 and 411 Power Supply on a dynamometer test bench. The user should have suitable technical training in mechanics and electronics in order to install and use this load monitoring unit without risk.

MANUAL ORGANIZATION

This section gives an overview of the structure of the manual and the information contained within it. Some information has been deliberately repeated in different sections of the document to minimize cross-referencing and to facilitate understanding through reiteration.

Summary of the different chapters :

Chapter 1: INTRODUCTION – Contains the technical data sheet for the DES 410 and DES 411 Power Supply and gives its technical characteristics as well as a brief overview of the application fields.

Chapter 2: INSTALLATION / CONFIGURATION – Contains the mounting and configuration instructions for the DES 410 and DES 411 Power Supply, the dynamometer and the DSP7001 Programmable Controller.

Chapter 3: CALIBRATION – Provides instructions

Chapter 4: REPAIR – Provides information on returning the unit to Magtrol for repair.

SYMBOLS USED IN THIS MANUAL

The following symbols and type styles may be used in this manual to highlight certain parts of the text:

Note: This is intended to draw the operator's attention to complementary information or advice relating to the subject being treated. It introduces information enabling the correct and optimal function of the product.

CAUTION: THIS IS USED TO DRAW THE OPERATOR'S ATTENTION TO INFORMATION, DIRECTIVES, PROCEDURES, ETC. WHICH, IF IGNORED, MAY RESULT IN DAMAGE TO THE MATERIAL BEING USED. THE ASSOCIATED TEXT DESCRIBES THE NECESSARY PRECAUTIONS TO TAKE AND THE CONSEQUENCES THAT MAY ARISE IF THESE PRECAUTIONS ARE IGNORED.

WARNING! THIS INTRODUCES DIRECTIVES, PROCEDURES, PRECAUTIONARY MEASURES, ETC. WHICH MUST BE EXECUTED OR FOLLOWED WITH THE UTMOST CARE AND ATTENTION, OTHERWISE THE PERSONAL SAFETY OF THE OPERATOR OR THIRD PARTY MAY BE AT RISK. THE READER MUST ABSOLUTELY TAKE NOTE OF THE ACCOMPANYING TEXT, AND ACT UPON IT , BEFORE PROCEEDING FURTHER.

1. Introduction

1.1 GENERAL INFORMATION

The Model DES 410 and 411 Power Supplies are designed for use with Magtrol's Eddy-Current and Powder Brake Dynamometers. The DES 410 and DES 411 supply the current to the coils of the brake within the dynamometer. They are controlled by an electronic peripheral, the Magtrol DSP7000 High Speed Programmable Controller.

Note: The DES 41x is intended for use in an industrial environment and meets the standard IEC 61326-1 class B / Industrial electromagnetic environment. For the immunity test, a deflection +/-3% FSD and +/- 6%FSD is admitted for each performance criteria A and B

1.2 DATA SHEET

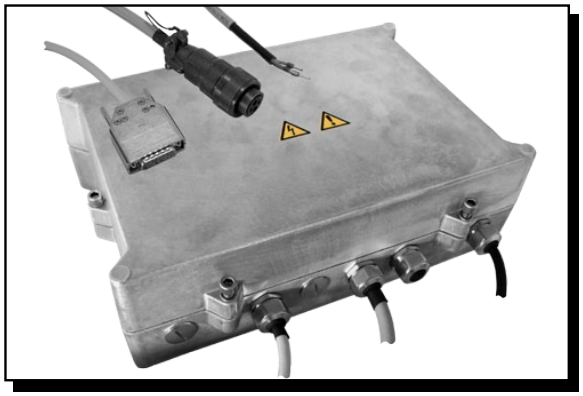
MAGTROL

DES410 /DES411
Data Sheet

DES 410 and DES 411 Power Supplies

FEATURES

- For use with Magtrol WB Eddy-Current and PB Powder Brake Dynamometers
- Controlled current supply, with overvoltage factor > 5
- Analog input for current set-point
- Selection of nominal current
- Control by digital inputs/outputs
- General alarm provided by relay
- 2 alarm outputs (temperature and electrical circuit)
- Available in either 115 or 230 VAC



DESCRIPTION

DES 410 and DES 411 Power Supplies are specially designed for the full range of Magtrol's Eddy-current and Powder brake dynamometers with the design goal providing the best response time. The DES 410 / DES 411 supplies are packaged in an industrial housing made of cast aluminum. This offers superior protection against radiated emissions in order to avoid any disruption of the surrounding electronics modules. This housing must be installed directly on the test bench, next to the brake, as close as possible.

The DES 410 / DES 411 supplies can be controlled by digital signals and analog set point coming from peripheral electronics. The DSP7000 Dynamometer Controller has been designed to work with the DES 41x.

Control

The Power supply can be switched ON by remote control. The Stand-by signal enables the output current to be delivered. This excitation current is controlled by a set-point in the 0-10VDC range. The nominal value of the excitation current is set by internal resistors. There are two discrete outputs for alarms (open collector). The first is the "Temperature Alarm". It will indicate if the cooling water of the Dynamometer or the inner temperature of the DES 41x are out of limits. The second is the "Electrical Alarm". It occurs when an over current or a short circuit is detected. The output current is immediately turned OFF and latched while the General Alarm Relay is set under its Alarm position. A low state for 200 ms of the Stand-by signal resets the latch.

For applications with tandem dynanometers, the DES 410/DES 411 units also control the power supply of the electromagnetic clutch.

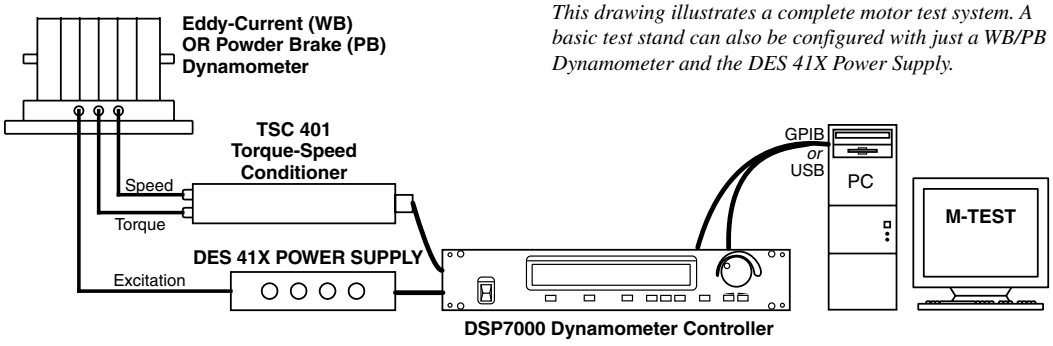
Supply Voltage

The main supply voltage of the DES 410/DES 411 is in the 115/230VAC/50/60Hz range. No selection is required. The DES 410 power supply features a galvanic insulation between the main circuit and the dynamometer power.

The DES 411 does not have galvanic separation. For safety reasons, the DES 41x case has to be grounded and the use of a ground fault current circuit breaker is recommended.

SYSTEM CONFIGURATION

This drawing illustrates a complete motor test system. A basic test stand can also be configured with just a WB/PB Dynamometer and the DES 41X Power Supply.



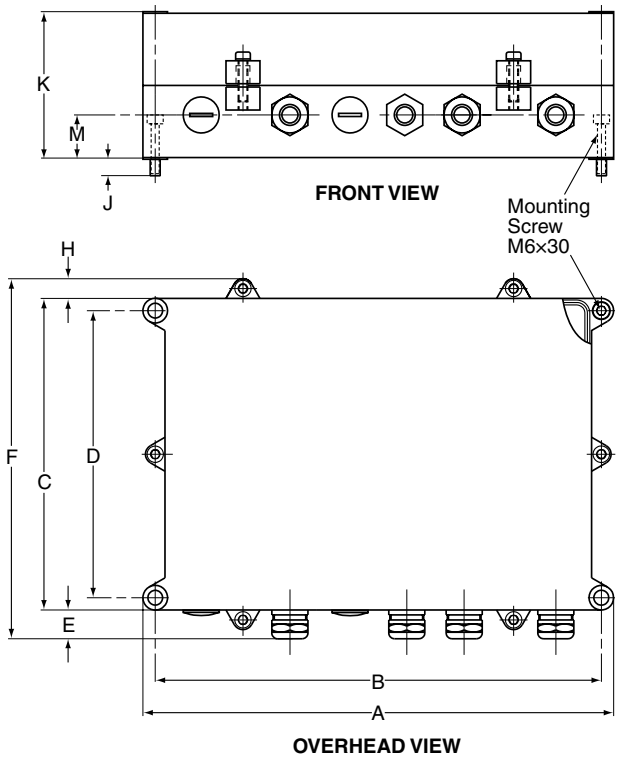
Specifications DES410 /DES411

RATINGS

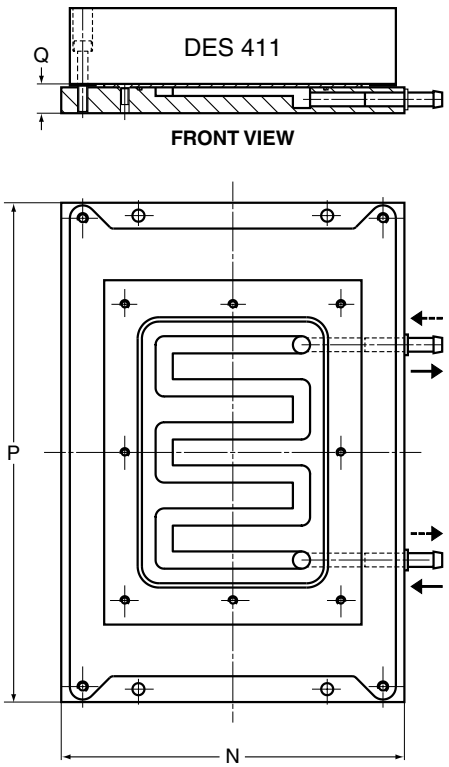
	DES 410	DES 411
NETWORK SUPPLY		
Voltage	115 VAC / 230 VAC ±15 %	
Frequency	50 Hz / 60 Hz	
Fuse	T1A or T2A depending on the brake(s)/ 115 VAC / 230 VAC	T2A to T12A depending on the brake(s)/ 115 VAC / 230 VAC
Maximum current	1 A + clutch	3 A + clutch / 230 VAC 6 A + clutch / 115 VAC
ELECTROMAGNETIC CLUTCH SUPPLY		
Voltage	115 VAC / 230 VAC	
Current	1 A	
SUPPLY FOR EXTERNAL USE		
Voltage	12 VDC ±5 %	
Maximum Current	300 mA	
SELECTION OF NOMINAL CURRENT		
(Selected by resistors)	0.5 A; 1.0 A; 1.5 A; 2.0 A	2.5 A; 4.0 A; 5.0 A; 7.5 A; 10.0 A; 12.0 A
EXCITATION SET-POINT		
Voltage	0 to 10 VDC	
Impedance	> 50 kΩ	
DIGITAL INPUTS (GALVANICALLY INSULATED)		
Remote Control of the Network Input (PSC)	Relay coil +24 VDC / 11 mA	
Control of the Electromagnetic Clutch	Optocoupler activated by +24 VDC / 2.5 mA	
Stand-by (enable)	Optocoupler activated by either +24 VDC or +12VDC / 2.5 mA max	
DIGITAL OUTPUTS (GALVANICALLY INSULATED)		
Temperature Alarms	2 open collector outputs: U_{max} = 40 VDC, I_{max} = 3 mA	
Electrical Alarm		
GENERAL ALARM		
Relay Contact	2 A / 30 VDC	
ENVIRONMENTAL CHARACTERISTICS		
Operating Temperature	0°C to +50°C	
Storage Temperature	-20°C to +70°C	
Humidity	0 to 90% as per DIN 40040	
Protection Class	IP 66	
Assembly	The housing must be electrically and thermally coupled to the metal frame of the test bench to allow heat dissipation.	
MECHANICAL CHARACTERISTICS		
Housing	Extruded cast aluminium	
Weight (without cable)	5.2 kg; 11.5 lb	
Weight (with integrated cable)	6.2 kg; 13.7 lb	

Specifications DES410 /DES411

DIMENSIONS



DES 411 Water Cooling System
(For all 15 series Dynamometers
except 1 WB 15 and 1 PB 15)



NOTE: *Original dimensions are in Metric units.*
Dimensions converted to English units have been rounded up to 2 decimal places.

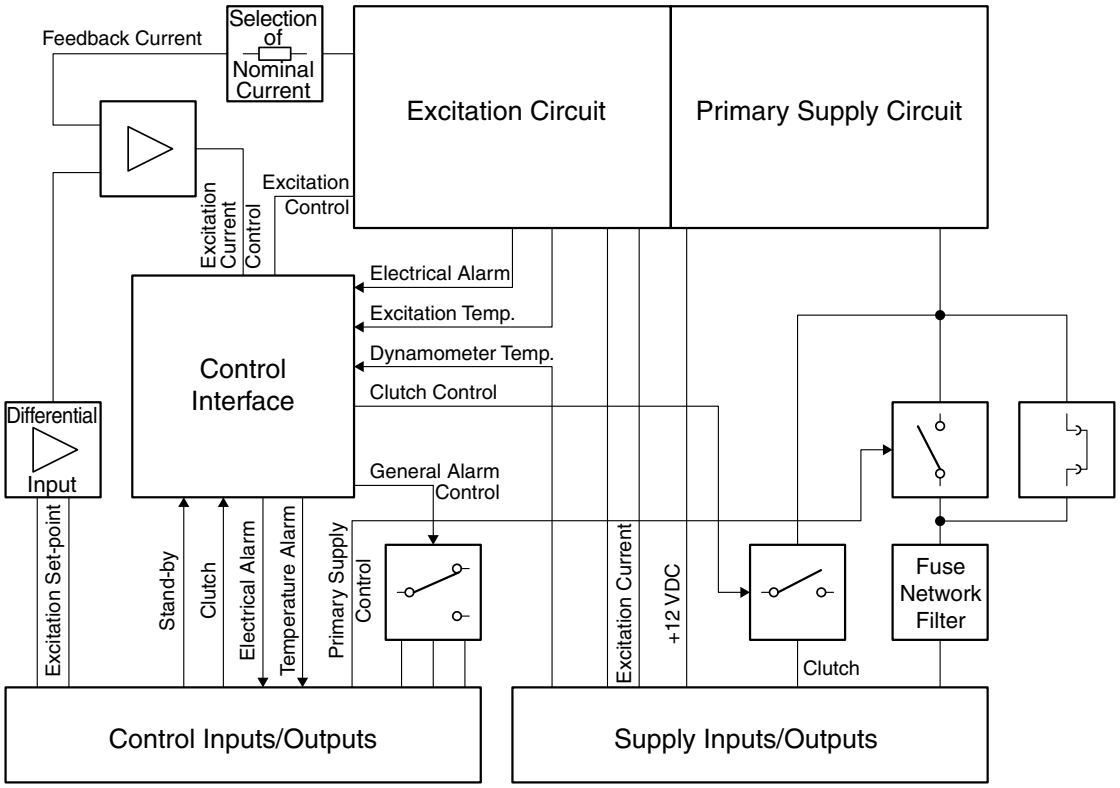
	A	B	C	D	E	F	H	J	K	M
mm	287	272	190	175	≈17	≈219	12	10	90	30
in	11.30	10.71	7.48	6.89	0.63	8.58	0.47	0.39	3.54	1.06

	N	P	Q
mm	200	290	15
in	7.87	11.42	0.59

The DES 410/DES 411 supplies are delivered with integrated cables (including connectors) with a length of 1.5 meters on the dynamometer connection side and 5 meters on the controller side. The DES 410/DES 411 units are to be mounted on a metallic surface in order to allow ample heat dissipation. For safety reasons, the DES 41x case has to be grounded. For 2-3-4 WB 15 and 2-4 PB 15 dynamometers, the DES 411/12x Power Supply with integrated Water Cooling System (see above drawing) should be used.

Specifications DES410 /DES411

BLOCK DIAGRAM



OPTIONS AND ORDERING INFORMATION

If the DES is ordered separately (from the dynamometer), it is absolutely necessary to specify which model of Eddy-current/ powder brake will be used with the DES power supply in order to limit the operating current and prevent possible damage to the dynamometer brake. Mains voltage (115 VAC or 230 VAC) should also be defined when ordering.

DESCRIPTION	MODEL	PART NUMBER
Power Supply for WB/PB 2.7 and 43 Dynamometers	DES 410/11x	234-410-000-11x
Power Supply for WB/PB 65, 115, 1 PB 15 and 1 WB 15 Dynamometers	DES 411/11x	234-411-000-11x
Power Supply with Water Cooling Plate for 2, 3, 4 WB 15 and 4 PB 15 Dynamometers	DES 411/12x	234-411-000-12x

NOTE: All DES 41X Power Supplies include the corresponding dynamometer connection cables. The last digit of the part Number refers to the cable lenght in accordancewith the following table.

LAST DIGIT X	CABLE LENGTH DYNAMOMETER SIDE	CABLE LENGTH CONTROLLER SIDE
1	1.5 m	5 m
2	1.5 m	10 m
3	1.5 m	20 m
4	2.5 m	5 m
5	2.5 m	10 m
6	2.5 m	20 m

2. Installation / Configuration

2.1 GENERAL DESCRIPTION

The housing of the power supply must be electrically and thermally connected to the metal frame of the test bench to allow heat dissipation.

The test bench as well as it's structure must be connected to earth (ground).

For safety reasons, the DES 41x case has to be grounded and the use of a ground fault current circuit breaker is recommended.

The dimensions necessary for mounting the housing of the power supply are provided in Figure 1. The data sheet provides all other dimensions necessary for the installation of the power supply. The housing of the DES 410 and DES 411 has four holes for mounting and includes the necessary four M6 × 30 hexagon socket head fixing screws.

To reach the mounting holes, it is necessary to remove six screws from the cover of the power supply.

Once the unit is installed and calibrated, for safety reasons, it is necessary to replace and secure the cover of the power supply.

The cover has to be mounted with the Yellow warnings placed as shown.

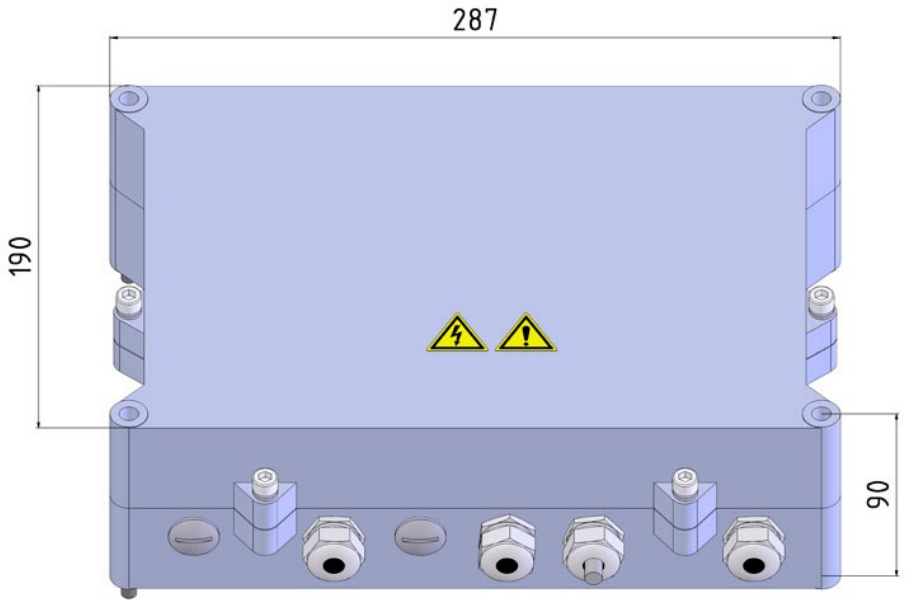


Figure 2–1 Dimensions of DES 410 and DES 411 case

2.2 DES 410 & DES 411 SAFETY WARNING

WARNING! THE DES 41X POWER SUPPLY MUST ALWAYS BE GROUNDED. MAKE SURE THE DES 41X IS TURNED OFF AND DISCONNECTED FROM THE CONTROLLER FOR 3 MINUTES BEFORE REMOVING THE HOUSING COVER. THE USER OR A THIRD PARTY COULD BE SERIOUSLY OR EVEN FATALLY INJURED IF THESE WARNINGS ARE IGNORED. THE USE OF A 6A/30MA GROUND FAULT CIRCUIT BREAKER IS RECOMMENDED

2.3 MOUNTING WITHOUT COOLING

For any DES 410 and for DES 411 Power Supply providing an excitation current up to 5A included (dynamometer models 1WB/PB 65, 2WB/PB 65, 1WB/PB 115, 2WB/PB 115 and 1WB/PB 15), a cooling plate is not required

The power supply can be mounted on a support fixed to the table or directly to the test bench. An example of such mounting is given in *Figure 2-2*

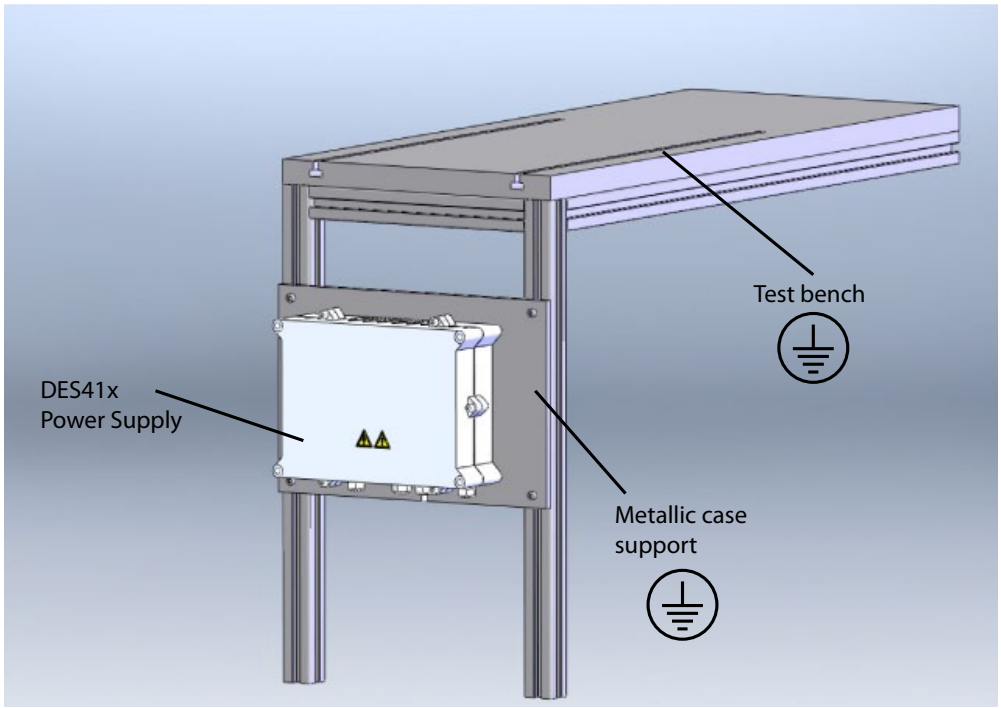


Figure 2–2 DES 410 Power Supply mounted to the table of a test bench without cooling

2.4 MOUNTING WITH COOLING PLATE (OPTIONAL)

For a DES 411 Power Supply providing an excitation current higher than 5 A (dynamometer models 2 WB/PB 15 and larger), a cooling plate is required.

Magtrol recommends the use of the Cooling Plate , P/N: 234-311-900-011. (see *Figure 2-3*).

Another solution is to mount the DES 411 on a metal plate having a minimal dimensions of 500 mm × 500 mm × 2 mm. It is necessary to mill holes in the plate for the feet of the unit in order to get a good thermal contact using heat sink compound to improve the thermal coupling. This plate can then be mounted to the test bench table. In both cases, with the power supply fixed to the cooling plate, it is recommended to attach the plate to the test bench.

An example of assembly is given in *Figure 2-4*.

The water flow through the cooling plate must be equal to 30 l/h. The differencial pressure should not be less than 0.05 bar. Furthermore, the absolute pressure at the inlet should not exceed 1.5 bar.

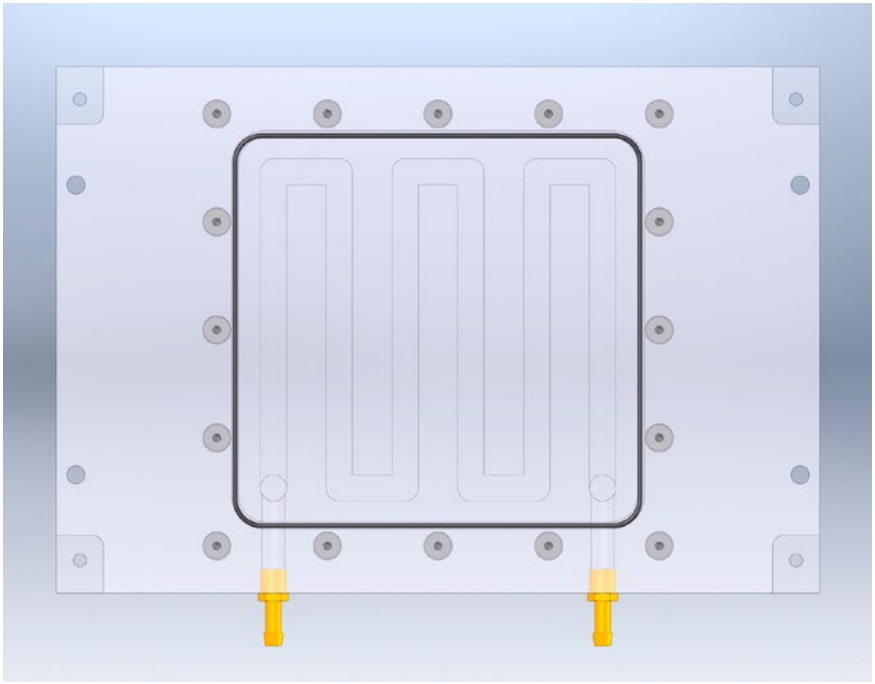


Figure 2–3 Cooling Plate (P/N 234-311-900-011)

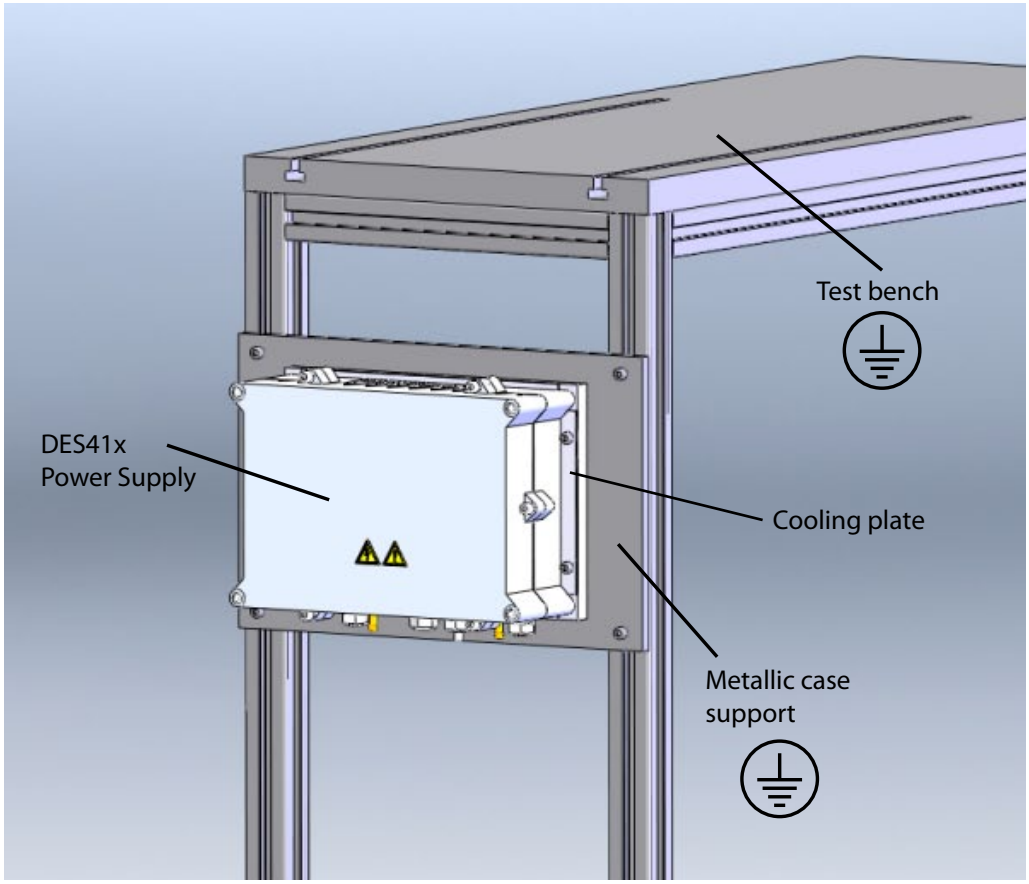


Figure 2–4 DES 411 Power Supply with cooling plate mounted to the test bench table

2.5 CONNECTION BETWEEN THE VARIOUS UNITS

A test bench includes not only the dynamometer, but also a TSC 401 Torque/Speed Conditioner and DES Series Power Supply. The test bench is controlled by a DSP 7000 Programmable Controller. *Figure 2-5* shows the connection between the various units in a test bench.

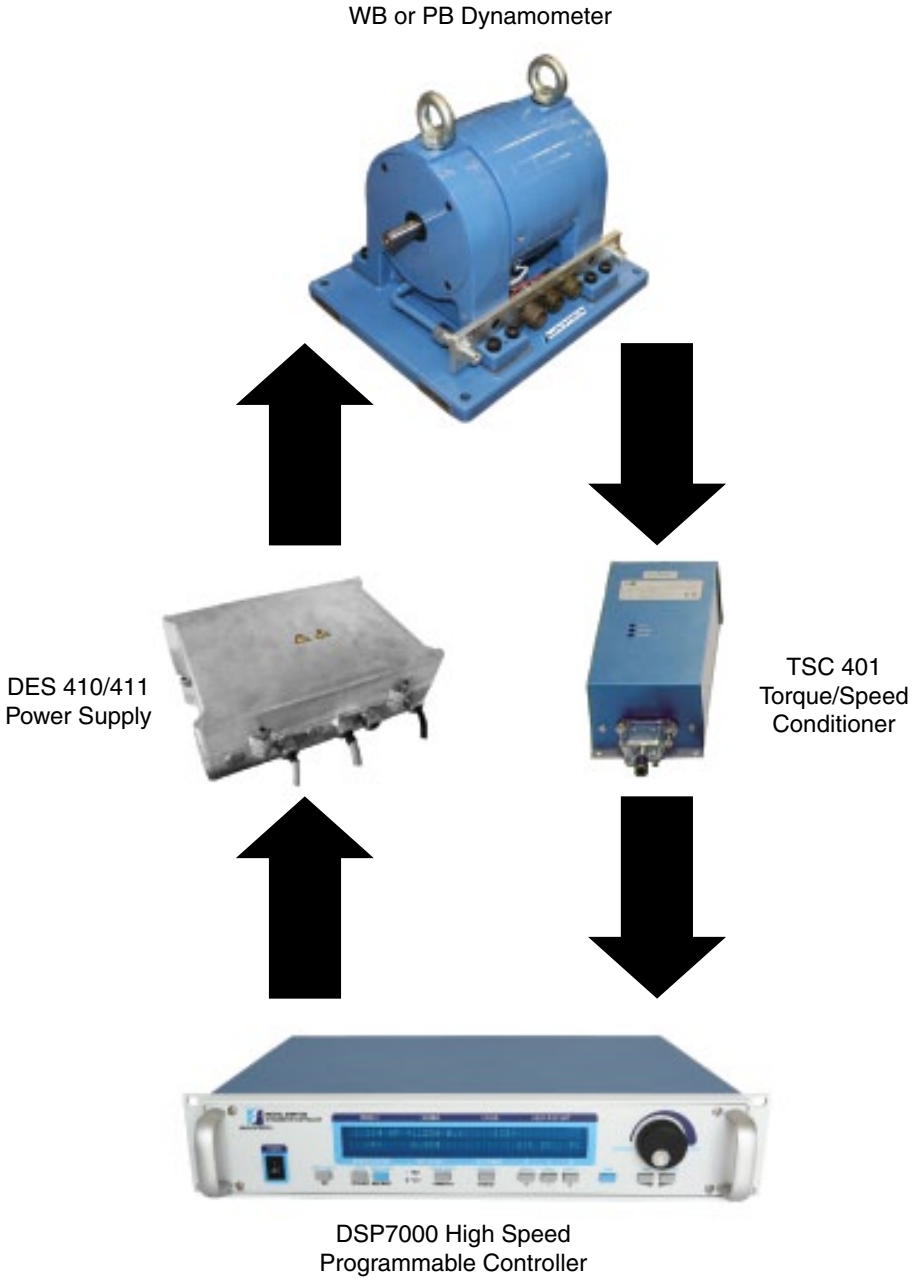


Figure 2–5 Connection between the various units in a test bench

Note: The DES 410/411 is fully compatible with the DSP 6001 Programmable controler

2.6 CONNECTING THE DES 410 AND DES 411 POWER SUPPLY

The DES 410 and DES 411 Power Supplies are sold as a kit, with the cables already connected.

The DES 410 and DES 411 Power Supplies are equipped with a stuffing gland which allows cables to pass through the wall of the housing of the unit while maintaining the seal of the housing and holding the cables.

2.6.1 PASSING UNSHIELDED CABLES INTO STUFFING GLAND

1. Strip the conductors from the various cables.
2. Remove the lid of the power supply housing by unscrewing its six screws.
3. Pass the cables into the stuffing gland by proceeding as follows *(see Figure 2-6)*:
   a. Unscrew element ① Counterclockwise. Element ④ must not be removed from the housing.
   b. Remove joints ② and ③ from element ①. These two elements allow the stuffing gland to adapt to various diameters of cable. Element ② Can be removed from element ③ by simply pushing it outwards.
   c. Pass the cables through elements ①, ② (if used), ③ and ④.
   d. Reassemble the elements of the stuffing gland and, before replacing element ①, lubricate the seal ③with silicone as indicated in *Figure 2-6*. Tighten element ①so that it projects beyond joints ②and/or ③to provide the degree of seal required.
4. Connect the conductors of the various cables to the terminals of the power supply unit.
5. Replace the cover of the power supply housing and tighten its six screws.

CAUTION : DO NOT DAMAGE THE SEALS WITH SHARP EDGED OBJECTS. CHECK THAT NO FOREIGN BODY CAN SLIDE BETWEEN THE ELEMENTS OF THE STUFFING GLAND. DE-GREASE THE SURFACE OF THE CABLE THAT WILL COME IN CONTACT WITH THE SEAL. THE STUFFING GLAND SEAL CANNOT BE GUARANTEED IF THESE INSTRUCTIONS ARE NOT FOLLOWED.

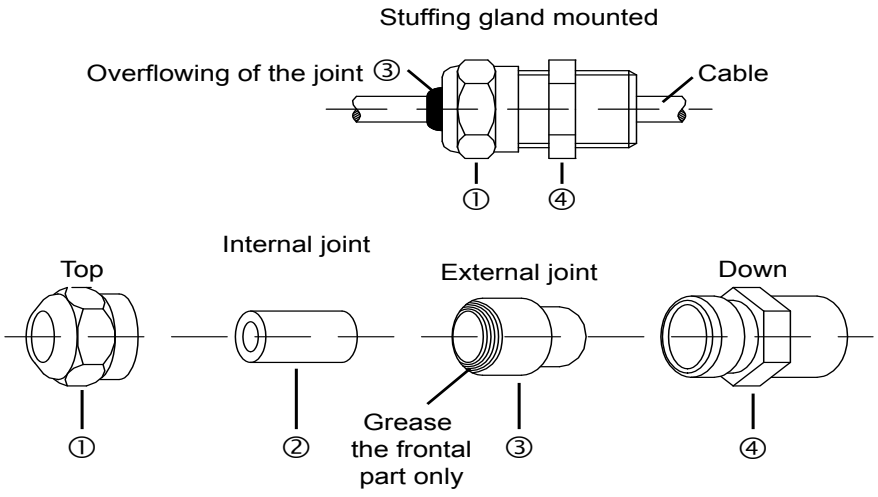


Figure 2–6 Stuffing gland (Overview and separated)

2.6.2 PASSING SHIELDED CABLES INTO STUFFING GLAND (WITH EMC STUFFING GLAND)

For ER 405, EH 147 and EN 104 cables (see drawings, paragraphe 2.8 and 2.9), EMC type stuffing gland are used.

1. Strip the conductors from the various cables.
2. Remove the lid of the power supply housing by unscrewing its six screws.
3. Pass the cables into the stuffing gland by proceeding as follows *(see Figure 2-6)*:
   a. Unscrew element ① Counterclockwise. Element ④ must not be removed from the housing.
   b. Remove joints ② and ③ from element ①. These two elements allow the stuffing gland to adapt to various diameters of cable. Element ② Can be removed from element ③ by simply pushing it outwards.
   c. Pass the cables through elements ①, ② (if used), ③.
   d. Strip the cable (outer sheath) to the elements ③ output and cut the shield over 5-8 mm as show in *Figure 2-7.* Pass the stripped cable through the element ④.
   e. Connect the shield on the metallic part of element ③ as show in *Figure 2-7.*
   f. Reassemble the elements of the stuffing gland (take care that the shield remains in place) and, before replacing element ①, lubricate the seal ③with silicone as indicated in *Figure 2-6*. Tighten element ①so that it projects beyond joints ②and/or ③to provide the degree of seal required.
4. Connect the conductors of the various cables to the terminals of the power supply unit.
5. Replace the cover of the power supply housing and tighten its six screws.

CAUTION : DO NOT DAMAGE THE SEALS WITH SHARP EDGED OBJECTS. CHECK THAT NO FOREIGN BODY CAN SLIDE BETWEEN THE ELEMENTS OF THE STUFFING GLAND. DE-GREASE THE SURFACE OF THE CABLE THAT WILL COME IN CONTACT WITH THE SEAL. THE STUFFING GLAND SEAL CANNOT BE GUARANTEED IF THESE INSTRUCTIONS ARE NOT FOLLOWED.

Figure 2–7 Connect Shiel of EMC Stuffing gland

2.7 CONFIGURATION OF THE DES 410 AND DES 411 POWER SUPPLY

The configuration of the DES 410 and DES 411 Power Supply requires a selection of fuses, resistors and SolderLink in accordance with the dynamometer model and the Main supply voltage.

2.7.1 DES 410 MAIN BOARD : F1,F2, F3, SL12, SW1 & SW2 LOCATION

The contacts SW1 and SW2 must be left Open to allow the DSP7000 to control the primary supply circuit.

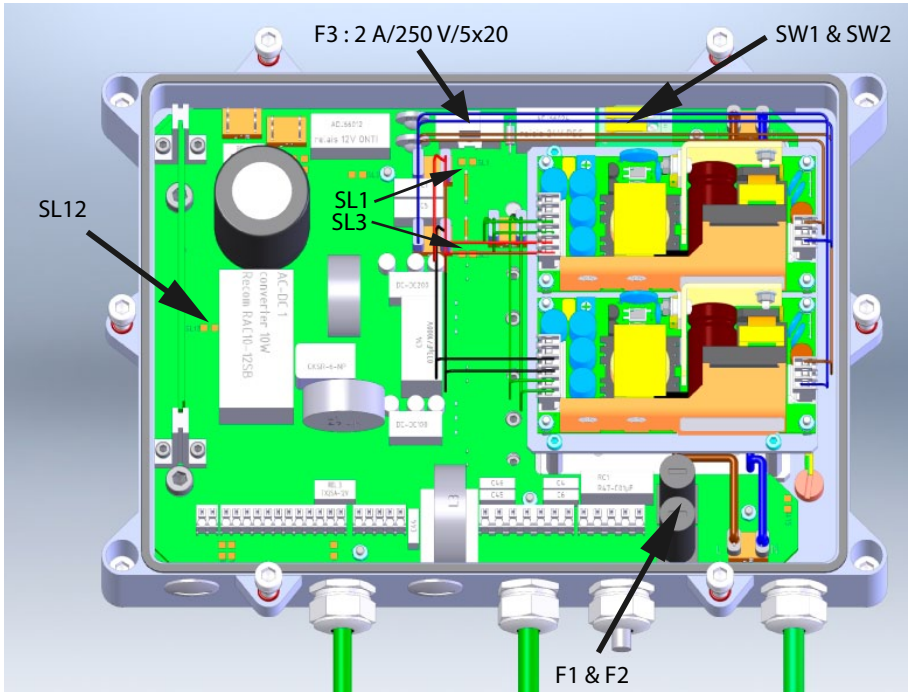


Figure 2–8 Location of fuses F1, F2, F3; SolderLink SL12 & Contacts SW1, SW2 on the DES 410 circuit

2.7.2 DES 411 Main Board: F1, F2, F3, SL12, SW1 & SW2 Location

The contacts SW1 and SW2 must be left Open to allow the DSP7000 to control the primary supply circuit.

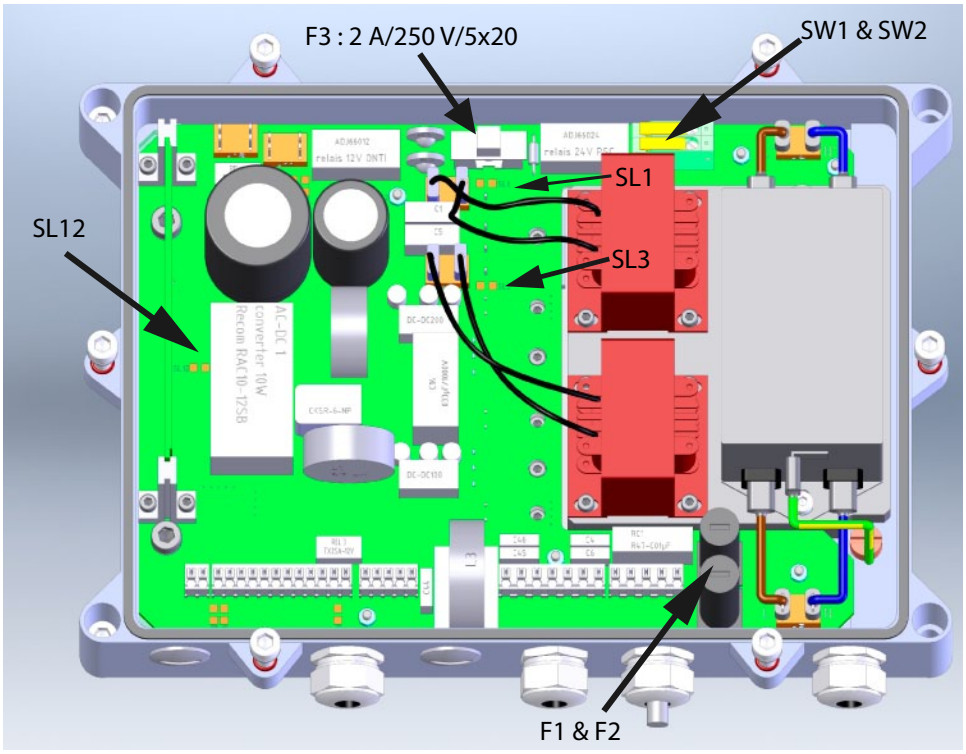


Figure 2–9 Location of fuses F1, F2, F3; SolderLink SL12 & Contacts SW1, SW2 on the DES 411 circuit

2.7.3 DES 410 & DES 411 CPLD Board : R39, R102, SL1 Location

Figure 2–10 Location of resistors R102, R39; SolderLink SL1 the DES 410 & DES 411 circuit

2.7.4 MAIN BOARD: F1, F2, F3, SL12, SL1, SL3, SW1 & SW3 SET-UP

- SL12: solder link is done for 230VAC only.
- SL1 & SL3: DES 411 only. They are to be done only for the xWB/PB15 under 100 - 115VAC.
- F3: 2AT/250V/5x20. Whatever the main supply voltage.
- The contact SW1 and SW2 must be let Open to allow the DSP7000 to control the primary supply circuit.
- F1=F2: xxAT/250V/ 6.3x32 in accordance with Table 1

2.7.5 CPLD BOARD: R39, R102, SL1 SET-UP

- R39 & R102 in accordance with Table 1
- SL1: Solder Link always Open unless otherwise stated.

2.7.6 SET-UP VALUES

Dynamometer WB/PB	DES 41x					
	Type	Iex [A]	R39 [Ohm]	R102 [Ohm]	115 V AC F1, F2	230 V AC F1, F2
1WB/PB2.7-8-K	410	0.5	348	none	T2A	T1A
2WB/PB2.7-8-K	410	1	1.21K	90.9K	T2A	T1A
3PB2.7-8-K	410	1.5	2.15K	36.5K	T2A	T2A
4WB/PB2.7-8-K	410	2	3.16K	21.5K	T2A	T2A
1WB/PB43	410	1	1.21K	90.9K	T2A	T1A
2WB/PB43	410	2	3.16K	21.5K	T2A	T2A
1WBPB65	411	2.5	499	none	T4A	T2A
2WB/PB65	411	5	1.54K	57.6K	T8A	T4A
1WB/PB115	411	2.5	499	none	T4A	T2A
2WB/PB115	411	5	1.54K	57.6K	T8A	T4A
1WB/PB15	411	4	1.1K	100K	T8A	T4A
2WB/PB15	411	7.5	2.61K	26.1K	T12A	T8A
3WB15	411	10	3.83K	15.8K	T12A	T8A
4WB/PB15	411	12	4.64	11.5K	T12A	T8A

CAUTION: MAKE SURE THE FUSE VALUE IS CORRECT. THE UNIT IS NO LONGER PROTECTED WHEN THE VALUE OF ONE OR ALL OF THE FUSES IS TOO HIGH. HOWEVER, THE FUSES ARE LIKELY TO BLOW PREMATURELY IF THEIR VALUE IS NOT SUFFICIENT.

2.8 CONNECTING THE DES 410 TO THE DSP 7000 CONTROLLER

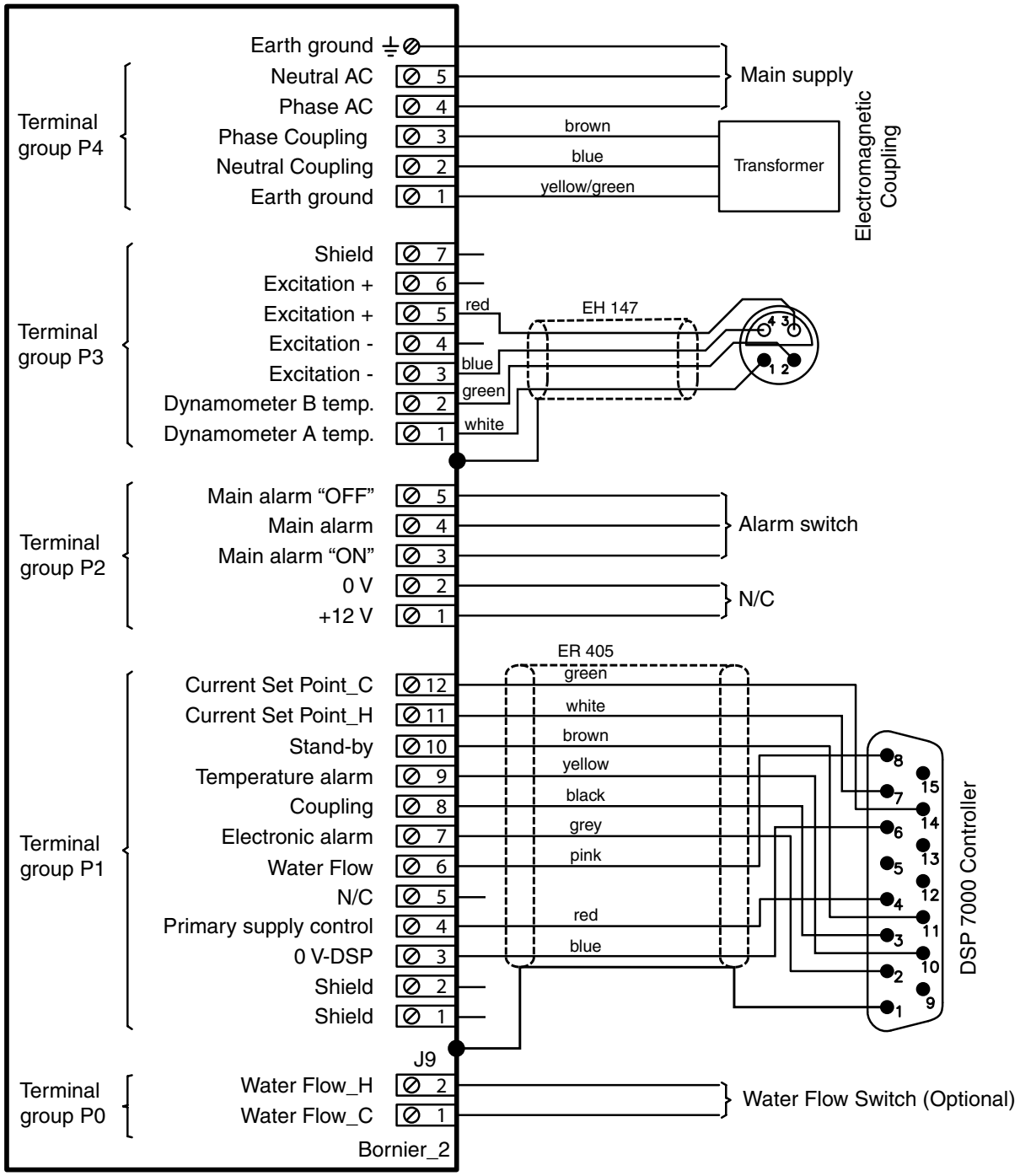


Figure 2–11 Connection of the DES 410 Power Supply to the Magtrol DSP 7000Controller.

Note: For EH 147 and ER 405 cables, using EMC type stuffing gland, ensure cable shield makes good contact with the aluminium housing.

2.9 CONNECTING THE DES 411 TO THE DSP 7000 CONTROLLER

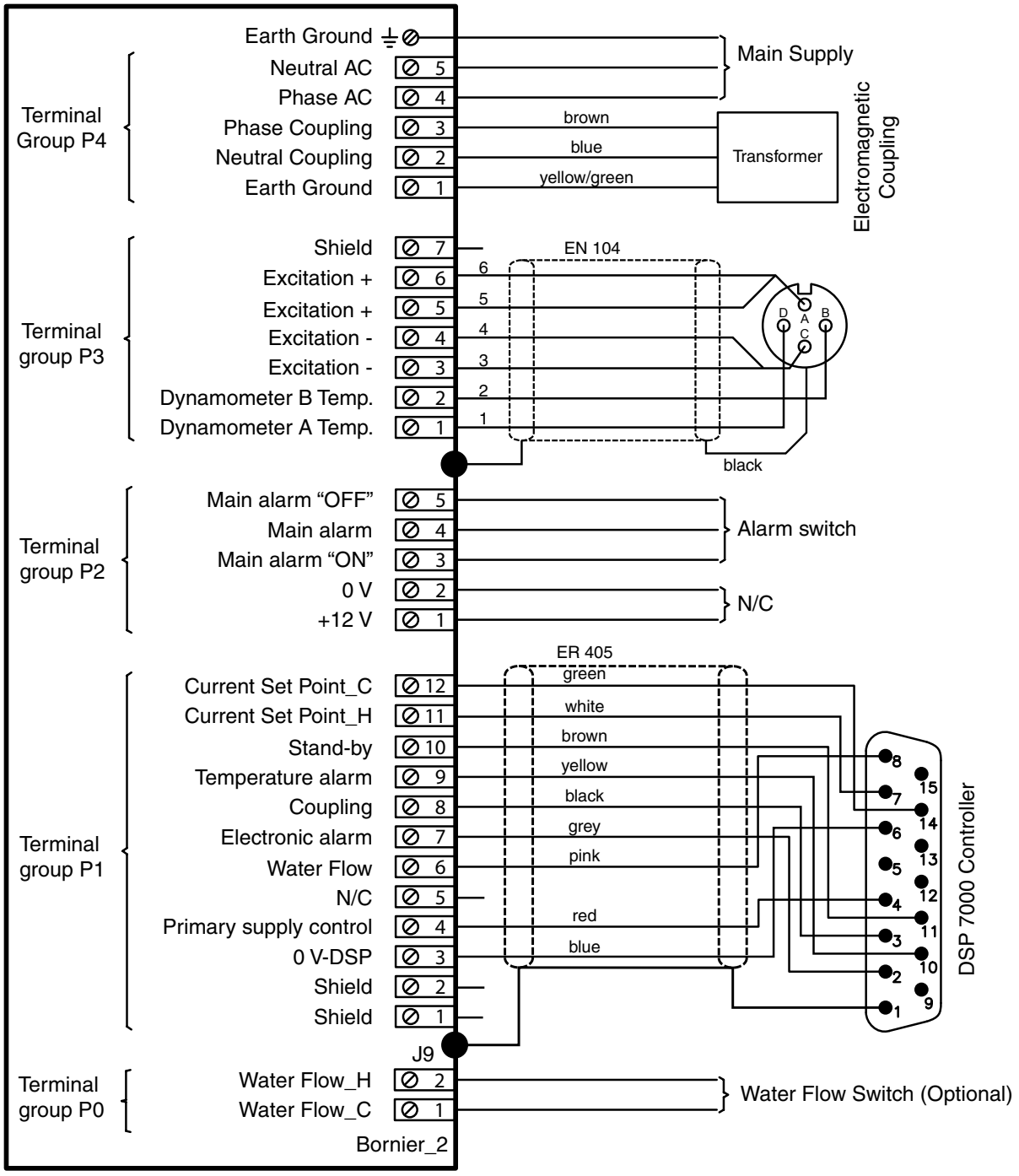


Figure 2–12 Connection of the DES 411 Power Supply to the Magtrol DSP 7000Controller.

Note: For EN 104 and ER 405 cables, using EMC type stuffing gland, ensure cable shield makes good contact with the aluminium housing.

3. Calibration

When the DES 410 or 411 Power Supply is purchased as part of a complete motor test system it is calibrated by Magtrol according to the dynamometer with which it will be used.

Calibration requires specific tools. If you are facing a calibration need, please contact our after sales service at:

Magtrol Inc.
70 Gardenville Parkway
Buffalo, NY 14224
Attn: Repair Department.
E-mail : repair@magtrol.com

Magtrol SA
After Sales Service
Route de Montena 77
1728 Rossens / Fribourg
Switzerland
E-mail : repair@magtrol.ch

4. Repair

4.1 REPAIR

In case of a defect, please refer to the warranty information at the back of this manual. Whether you are directed to ship your equipment to Magtrol. Inc. in the United States or Magtrol SA in Switzerland, it is very important to include the following information with your return shipment:

- Model number, part number, serial number, order number and date of acquisition
- Description of the defect and the conditions in which it appeared
- Description of the test bench (drawing, photographs, sketches, etc.)
- Description of the tested object (drawing, photographs, sketches, etc.)
- Description of the test cycle

To allow Magtrol to complete the work in the best possible time, carefully pack the power supply and follow the procedure outlined here when returning your equipment for repair.

- Pack carefully the power supply unit
- Join the report of imperfection indicating the problems

Note : Do not hesitate to contact the Magtrol sales department for further information.

Service Information

RETURNING MAGTROL EQUIPMENT FOR REPAIR AND/OR CALIBRATION

Before returning equipment to Magtrol for repair and/or calibration, please visit Magtrol's Web site at http://www.magtrol.com/support/rma.htm to begin the Return Material Authorization (RMA) process. Depending on where the equipment is located and which unit(s) will be returned, you will be directed to either ship your equipment back to Magtrol, Inc. in the United States or Magtrol SA in Switzerland.

Returning Equipment to Magtrol, Inc. (United States)

When returning equipment to Magtrol, Inc.'s factory in the United States for repair and/or calibration, a completed Return Material Authorization (RMA) form is required.

1. Visit Magtrol's Web site at http://www.magtrol.com/support/rma.htm to begin the RMA process.
2. Complete the RMA form online and submit.
3. An RMA number will be issued to you via e-mail. Include this number on all return documentation.
4. Ship your equipment to:
   MAGTROL, INC.
   70 Gardenville Parkway
   Buffalo, NY 14224
   Attn: Repair Department
5. After Magtrol's Repair Department receives and analyzes your equipment, a quotation listing all the necessary parts and labor costs, if any, will be faxed or e-mailed to you.
6. After receiving your repair estimate, provide Magtrol with a P.O. number as soon as possible. A purchase order confirming the cost quoted is required before your equipment can be returned.

Returning Equipment to Magtrol SA (Switzerland)

If you are directed to ship your equipment to Switzerland, no RMA form/number is required. Just send your equipment directly to Magtrol SA in Switzerland and follow these shipment instructions:

1. Ship your equipment to:
   MAGTROL SA
   After Sales Service
   Route de Montena 77
   1728 Rossens / Fribourg
   Switzerland
   VAT No: 485 572
2. Please use our forwarder : TNT • 1-800-558-5555 • Account No 154033
   Only ship ECONOMIC way (3 days max. within Europe)
3. Include the following documents with your equipment:
   - Delivery note with Magtrol SA's address (as listed above)
   - Three pro forma invoices with:
     - Your VAT number
     - Description of returned goods
     - Noticed failures
     - Value - for customs purposes only
     - Origin of the goods (in general, Switzerland)
4. A cost estimate for repair will be sent to you as soon as the goods have been analyzed. If the repair charges do not exceed 25% the price of a new unit, the repair or calibration will be completed without requiring prior customer authorization.

MAGTROL INC
70 Gardenville Parkway
Buffalo, New York 14224 USA
Phone: +1 716 668 5555
Fax: +1 716 668 8705
E-mail: magtrol@magtrol.com

MAGTROL SA
Route de Montena 77
1728 Rossens/Fribourg, Switzerland
Phone: +41 (0)26 407 3000
Fax: +41 (0)26 407 3001
E-mail: magtrol@magtrol.ch

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